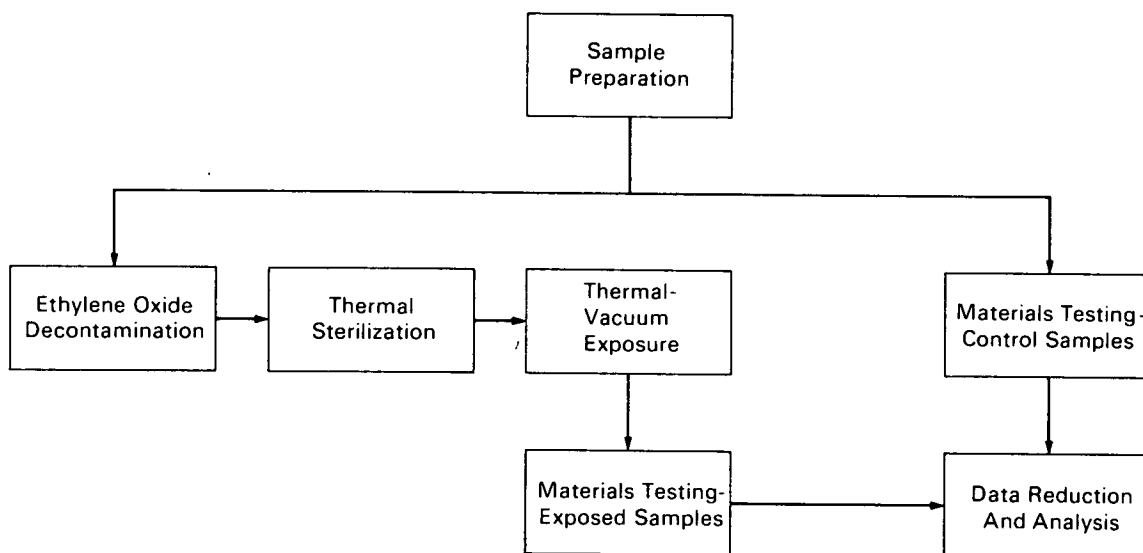


NASA TECH BRIEF



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Effects of Decontamination, Sterilization, and Thermal Vacuum on Polymeric Products



Exposure and Test Sequence

The effects of various sterilization environments on certain polymeric products have been determined. The material categories selected for this program were: (1) adhesives; (2) coatings; (3) coated fabrics; (4) elastomers; (5) encapsulants; (6) films; (7) hardware and structural materials; and (8) tapes. Each product was subjected to the following exposure sequence: (1) six 30-hr decontamination cycles in a humidified ethylene oxide-freon atmosphere at 50°C; (2) six 96-hr thermal-sterilization cycles in a dry nitrogen atmosphere at 135°C; and (3) one 500-hr thermal-vacuum exposure at 135°C and 10^{-6} torr.

The test sequence is outlined in the figure. Material properties were measured without exposure to the

three environments (control specimens), as well as after exposure. The physical, mechanical, and electrical tests employed for each class of materials were; (1) adhesive shear strength; (2) adhesion; (3) adhesive creep; (4) weight change; (5) volume resistivity; (6) dielectric strength; (7) breaking strength; (8) dimensional change; (9) tensile strength; (10) tear strength; and (11) hardness and compression set.

The test results indicated that of the products tested, the epoxy and fluorocarbon materials were the least affected; polyesters and polyurethanes were the most affected. Of the material categories, tapes and elastomeric products were affected the most by the exposures.

(continued overleaf)

Notes:

1. This study was conducted primarily on polymeric products for use on spacecraft, but it should also be of interest to designers of equipment where vacuum or heat applications relating to polymeric products are a factor.
2. The following documentation may be obtained from:

Clearinghouse for Federal Scientific
and Technical Information
Springfield, Virginia 22151
Single document price \$3.00
(or microfiche \$0.65)

Reference:

NASA-CR-103426 (N69-31924), Effects
of Decontamination, Sterilization, and
Thermal Vacuum on Spacecraft Poly-
meric Products

Patent status:

No patent action is contemplated by NASA.

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